## Document Log Item

Body

## Document Body

Adam and all,

Deliberative Ex. (b)(5)

███████████████████████████████████████████████████
███████████████████████████████████████████████████
████████████████ .

Deliberative Ex. (b)(5)

███████████████████████████████████████████████████
███████████████████████████████████████████████████
███████████████████████████████████████████████████
██████████████████████████

███████████████████████████████████████████████████
███████████████████████████████████████████████████
███████████████████████████████████████████████████

[redacted]

[redacted]

[redacted]

[redacted]

George

David Basinger---08/27/2009 10:29:26 AM---

[redacted]

| | |
|---|---|
| From: | David Basinger/R9/USEPA/US |
| To: | Adam Freedman/R9/USEPA/US@EPA |
| Cc: | R9-Deep |
| Date: | 08/27/2009 10:29 AM |
| Subject: | Re: Fw: Vulnerability Evaluation should be conducted |

██████████████████████████████

██████████████████████████████████████████████
████████████████████████████████████

███████████████████████████████████████████
████████████████████████████████████████
███████████████████████████████████████████████
███████████████████████████████████████████████
██████████████████████████████████████████
██████████████████████████████████████

Dave

Adam Freedman---08/26/2009 10:44:52 AM---A few more thoughts from Victor about the Vulnerability Evaluation... ----- Forwarded by Adam Freedm

From:      Adam Freedman/R9/USEPA/US
To:        R9-Deep
Date:      08/26/2009 10:44 AM
Subject:   Fw: Vulnerability Evaluation should be conducted

A few more thoughts from Victor about the Vulnerability Evaluation...

----- Forwarded by Adam Freedman/R9/USEPA/US on 08/26/2009 10:43 AM -----

From:      "Chan, Victor M." <VMChan@SolanoCounty.com>
To:        Adam Freedman/R9/USEPA/US@EPA

Cc:        "Iravani, Saeed N." <SNIravani@SolanoCounty.com>, "Kaltreider, Misty C."
           <MKaltreider@solanocounty.com>, "Bell, Jeffery" <JBell@solanocounty.com>, "Leland,
           James H." <JHLeland@SolanoCounty.com>, <fgolden@aspeneg.com>, <jhbeyer@lbl.gov>,
           <heath.nevels@shell.com>, "Geisert, Matthew" <MGeisert@solanocounty.com>, Adam Freedman/
           R9/USEPA/US@EPA, "Burton, Nicholas S." <NSBurton@SolanoCounty.com>, "Profant, Michael
           E." <MEProfant@SolanoCounty.com>, "Serrano, Ricardo" <RSerrano@SolanoCounty.com>,
           "Schmidtbauer, Terry" <TSchmidtbauer@SolanoCounty.com>, "Louie, James A."
           <JALouie@SolanoCounty.com>, <wayne.hamilton@shell.com>, <barbara.kornylo@shell.com>,
           <edward.hymes@shell.com>, <hbopp@consrv.ca.gov>, "Padilla, Edward L."
           <EPadilla@solanocounty.com>
Date:      08/26/2009 10:21 AM
Subject:   RE: Vulnerability Evaluation should be conducted

Adam

You asked me a question on what part of the EPA's Vulnerability Evaluation is the most important issue to me.

Answer: Chapter 5 on the seismic vulnerability evaluation.

I have two Issues on seismic vulnerability evaluation:

(1) Naturally Occurring Seismic analysis should consider the MCE and not the MPE. Since an EQ causing the crack 2 miles deep is extremely unlikely, I would be more concerned about the integrity of the well after a MCE event. I am assuming the selection of the concrete and steel are such as to maximize the ductility and yielding of the well. There should also be multiple plugs to increase safety. The seismic analysis should determine the MCE in the area and determine if the well design can handle this event. This should be a fairly straight-forward conventional seismic analysis.

(2) Induced Seismic analysis. This is much more problematic. See http://www.netl.doe.gov/publications/proceedings/01/carbon_seq/p37.pdf I expect "induced seismic activity caused

by CO2 injection" will be controversial especially in California because of the uncertainty and because the analysis is NOT straight forward. Since DOE wrote this paper, I would suggest the authors of this technical paper or a highly regarded expert assist the project team in the Vulnerability Evaluation in order to address the potential of induced seismic activity caused by CO2 injection.

Bottomline: Solano County needs assurances that the initial pilot project and the subsequent CO2 injection will not trigger an EQ and that the well design will withstand a naturally occurring MCE event.

Victor M Chan, PE, BCEE

**From:** Chan, Victor M.

**Sent:** Tuesday, August 25, 2009 1:35 PM

**To:** 'barbara.kornylo@shell.com'; 'wayne.hamilton@shell.com'

**Cc:** Iravani, Saeed N.; Kaltreider, Misty C.; Bell, Jeffery; Leland, James H.; 'fgolden@aspeneg.com'; 'jhbeyer@IbI.gov'; 'heath.nevels@shell.com'; Geisert, Matthew; 'hpapp@consrv.ca.gov'; 'edwardhymes@shell.com'; 'freedman.adam@epa.gov'; Burton, Nicholas S.; Profant, Michael E.; Serrano, Ricardo; Schmidtbauer, Terry; Louie, James A.

**Subject:** Vulnerability Evaluation should be conducted

Barbara and Wayne

I want to thank all attendees for the presentation. The presentation answered all of my questions that I raised in an earlier email and I do appreciate that.

FYI. The US EPA's Vulnerability Evaluation is located at:

http://www.epa.gov/climatechange/emissions/downloads/VEF-Technical_Document_072408.pdf

The purpose of the US EPA's Vulnerability document is stated in the introduction of this document which I have cut and pasted below:

**A large body of literature indicates that GS is a viable technology that can be conducted in a safe manner when coupled with a comprehensive approach to ensure protection of human health and the environment. Nonetheless, there are potential risks and uncertainties associated with GS. To systematically identify those conditions that could increase the potential for adverse impacts from GS, the U.S. Environmental Protection Agency (EPA) has developed a Vulnerability Evaluation Framework (VEF)**

I intend to recommend to the Solano County's Planning Division that a "Vulnerability Evaluation" be conducted for this project. This will ensure no adverse impact will be developed by this project. This will make adoption by the Planning Commission and by the General Public a lot easier …assuming a Vulnerability Evaluation Report concludes that there is a low risk (and not an elevated risk) and that the project follows this EPA's vulnerability framework which includes construction and monitoring. The EPA document is somewhat generic but systematic. It is my professional opinion that compliance with this EPA document will lower the project risk.

**Victor M Chan, PE, BCEE**
**Solano County Civil / Environmental Engineer**
**Board Certified Environmental Engineer www.aaee.net**
**707-784-3177**